

new information by dividing the local track PDF by the incoming track. The neighboring node then sends out its own tracks. A local particle population is used to generate a Gaussian mixture approximation. The local and incoming PDFs are evaluated at each particle position, divided, and applied as a weight to the particles.

Independent claims 1 and 5 broadly encompass the foregoing features by reciting, among other elements, maintaining a set of particles and associated weights, which represent an estimate of the system state, representing the estimated system state as a mixture of Gaussian distributions, and communicating said mixture to neighboring nodes, and in response to receiving said mixture from a neighboring node, updating the estimate of the system state that is maintained at the node.

The combination of *Mookerjee* and *Eid* fails to disclose or suggest every feature recited in the claims as alleged.

Mookerjee discloses a system that estimates the states of a system having multidimensional parameters. The system uses Kalman filters to explicitly include the physical bounds on uncertain parameters, separates a state estimation covariance into components attributable to measurement error and parameter uncertainty, and separately propagates these covariances from one time index k to a next time index $k+1$. Based on the propagated covariances, the gain matrix K is computed to weigh the measurements and establish the state estimates.

In a previous response filed on October 13, 2009, Applicant argued that the Kalman filters described by *Mookerjee* are not analogous to the particle filter architecture recited in Applicant's claims. Namely, one of ordinary skill would have understood that a Kalman filter and a particle filter are two distinct estimation techniques such that a Kalman filter is incapable of maintaining a set of particles and

associated weights as does the estimation technique recited in independent claims 1 and 5. The Examiner's failure to respond to this argument in the final Office Action dated January 19, 2010 and the current Office Action serves as an acquiescence to Applicant's position. Hence, these established distinctions render the obviousness rejection improper and worthy of withdrawal.

The Examiner concedes that *Mookerjee* fails to disclose or suggest a network of a plurality of nodes as recited in the claims, and relies on *Eid* in an effort to remedy this deficiency. However, Applicant does not believe that a sufficient nexus exists between these references such that their hypothetical combination is reasonable.

Eid is directed to a fault tolerant liquid measurement system that includes a plurality of sensors for measuring parameters of a liquid in a container, and uses a neural network to process sensor measurement signals. In particular, measurement signals for each sensor are provided to a processor that groups and processes the sensor data to determine a likelihood of measurement signal validity for each set.

Mookerjee is related to a parameter estimation system that includes a method of empirical optimization. The parameter estimation is described in the context of a target tracking system that includes a radar system and an aircraft. More importantly, *Mookerjee* does not disclose the implementation of this system across a network of plural nodes. Rather, as shown in Figure 1, Mookerjee implements a target tracking system using an antenna to transmit and receive RADAR signals in order to generate output measurements which are then sent to a unit to be processed then displayed. Figure 1 illustrates a traditional centralized algorithm, where signals are received and transmitted to one central processor.

The Examiner alleges that one of ordinary skill would combine the system of *Mookerjee* with the network implementation described in *Eid*. However, as one of ordinary skill would have understood, neural networks require training and the neural network in its entirety processes the input sensor signals. In other words, the propagation of parameters and signals throughout the entirety of a network like *Eid* would likely frustrate the calculation of estimates to operate a control system or control a process as discussed in *Mookerjee*. For at least these reasons, one of skill in the art starting with the disclosure of *Mookerjee* would not have looked to *Eid* in an effort to implement target tracking over plural nodes as is provided in a network.

Even assuming *arguendo*, however, that the Examiner believes that this combination is reasonable, this prior art combination still does not embody the features recited in Applicant's claims. Namely, *Eid* discloses that each sensor sends measurement signals to a "central processor", which processes the signals as a group. There is nothing in *Eid* that discloses or suggests plural nodes having the structural or functional capacity to achieve the results as recited in Applicant's claims 1 and 5. In fact, the network of sensors discussed in *Eid* operates in much the same manner as the sensor/processor configuration described in *Mookerjee*, where the network is "centralized" in which each sensor collects data and sends the data to a central processor for processing.

The Examiner also acknowledges that the combination of *Eid* and *Mookerjee* fails to disclose or suggest representing the estimated system state as a mixture of Gaussian distributions, as recited in Applicant's claims. *Rui* is applied in an effort to remedy this deficiency. *Rui* is directed to a system and process for tracking an object state over time using a particle filter sensor fusion technique and a plurality of

logical sensor modules. Each sensor tracks an object and provides object state estimates to a fuser. The fuser generates a proposal distribution by integrating the tracking results from the multiple trackers (sensors). The proposal distribution represents a mixture of Gaussian distributions (pgph [0060]).

Rui, however, does not remedy the deficiencies of *Mookerjee* and *Eid* as it relates to Applicant's claimed plurality of nodes and each node having the structural and functional capacity to estimate a system state as a mixture of Gaussian distributions. In contrast, *Rui* discloses the use of a centralized network where each sensor sends tracking information to a fuser, which generates a proposal distribution representing a mixture of Gaussian distributions for the plural sensors (Rui, pgph [0060]).

In summary, *Mookerjee*, *Eid*, and *Rui* when applied individually or in combination as alleged by the Examiner, fail to disclose or suggest every feature and/or the combination of features recited in Applicant's claims 1 and 5. Accordingly, a *prima facie* case of obviousness has not been established and withdrawal of this rejection is deemed appropriate.

Conclusion

For at least the reasons stated above, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections and objections, and to allow the present application.

In the event, the Examiner has any further concerns preventing allowance of the claims and/or application, the same is invited to contact Applicant's representative identified below.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Respectfully submitted,

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